## WHAT IS CLAIMED IS:

1	1. An apparatus for processing telecommunication signals, the apparatus			
2	being adapted to perform a frame classification process and a rate determination process			
3	associated with a bitstream representing one or more frames of data encoded according to a			
4	first voice compression standard from a bitstream representing one or more frames of data			
5	according to a second compression standard or associated with a bitstream representing one			
6	or more frames of data encoded according to a first mode to a bitstream representing one or			
7	more frames of data according to a second mode within a single voice compression standard,			
8	the apparatus comprising:			
9	a source bitstream unpacker, the source bitstream unpacker being adapted to			
10	separate a voice code from a source codec into one or more separate codes representing one			
11	or more speech parameters and being adapted to generate one or more parameters for input			
12	into the frame classification and rate determination process;			
13	more than one parameters buffers coupled to the source bitstream unpacker,			
14	the one or more parameters buffers being adapted to store the one or more input parameters			
15	and one or more output parameters of the frame classification and rate determination process			
16	from the one or more bitstream frames;			
17	a frame classification and rate determination module coupled to the more than			
18	one parameters buffers, the frame classification and rate determination module being adapted			
19	to input one or more of selected classification input parameters, the frame classification and			
20	rate determination module being adapted to output a frame class, a rate decision and one or			
21	more classification feature parameters.			
1	2. The apparatus of claim 1 wherein the source bitstream unpacker			
2	2. The apparatus of claim 1 wherein the source bitstream unpacker comprises:			
3	a code separator, the code separator being adapted to receive an input from a			
<i>3</i>	bitstream frame of data encoded according to a voice compression standard and being			
5	adapted to separates one or more indices representing one or more speech compression			
6				
7	parameters;  single or multiple unquantizer modules coupled to the code separator, the			
8	single or multiple unquantizer modules being adapted to unquantize one or more codes of			
9	each of the speech compression parameters; and			
フ	each of the specificompression parameters, and			

10	a classifier input parameter selector coupled to the single or multiple			
11	unquantizer modules, the classifier input parameter selected being adapted to selects one or			
12	more inputs used in a classification process.			
13				
1	3. The apparatus of claim 1 wherein the source bitstream unpacker			
2	comprise a single module or multiple modules.			
1	4. The apparatus of claim 1 wherein the more than one parameter buffers			
2	comprise:			
3	an input parameter buffer, the input parameter buffer being adapted to store			
4	one or more of the input parameters of one or more of the frames for the frame classification			
5	and rate determination module;			
6	an output parameter buffer coupled to the input parameter buffer, the output			
7	parameter buffer being adapted to store the output parameters of one or more of the frames			
8	for the frame classification and rate determination module;			
9	more than one intermediate data buffers coupled to the output parameter			
10	buffer, the more than one intermediate data buffers being adapted to store one or more states			
11	of a sub-classifier; and			
12	more than one command buffers coupled to the more than one intermediate			
13	data buffers, the more than one command buffers being adapted to store one or more external			
14	control signals of one or more of the frames.			
1	5. The apparatus of claim 1 wherein the frame classification and rate			
2	determination module comprises:			
3	a classifier comprising one or more feature sub-classifiers, the one or more			
4	feature sub-classifiers being adapted to perform prediction and/or classification of a particular			
5	feature or a pattern classification, and			
6	a final decision module coupled to the one or more feature sub-classifiers, the			
7	final decision module being adapted to receive one or more outputs of each of the one or			
8	more multiple feature sub-classifiers input and output parameters and external control signals			
9	the final decision module being adapted to output one or more final results of the frame class,			
10	the rate decision and one or more predicted values of one or more of the classification			
<b>l</b> 1	features, the one or more predicted values being associated with an encoding process of a			

destination codec.

6. The apparatus of claim 1 wherein the frame classification and rate determination module is a single module or multiple modules.

- 7. The apparatus of claim 1 where the source codec comprise its
  bitstream information, the bit stream information including pitch gains, fixed codebook gains,
  and/or spectral shape parameters.
  - 8. The apparatus of claim 1 where the second mode is associated with a single voice compression standard, the single voice compression standard is characterized as a variable rate codec, whereupon the one or more parameters for inputs is associated with a selection of a transmission data rate.
- 9. The apparatus of claim 1 where the second mode is associated with a single voice compression standard, the single voice compression standard causes classification of the bitstream representing one or more frames of data encoded.
  - 10. The apparatus of claim 5 wherein the one or more feature subclassifiers comprise a plurality of pre-installed coefficients, the pre-installed coefficients being maintained in memory.
  - 11. The apparatus of claim 5 wherein the one or more feature subclassifiers can be adapted based on the second mode and on or more external command signals.
    - 12. An apparatus as in claim 5, wherein each of the one or more feature sub-classifiers being adapted to receive an input of selected classification input parameters, past selected classification input parameters, past output parameters, and selected outputs of the other sub-classifiers.
    - 13. An apparatus as in claim 5, wherein each of the one or more feature sub-classifiers that determines the class or value of a feature which contributes to one or more of the final decision outputs of the frame classification and rate determination module may take the structure of a different classification process.
  - 14. An apparatus as in claim 5, wherein one of the feature sub-classifiers that determines the class or value of a feature which contributes to one or more of the final

- 3 decision outputs of the frame classification and rate determination module may be an
- 4 artificial neural network Multi-Layer Perceptron Classifier.
- 1 15. An apparatus as in claim 5, wherein one of the feature sub-classifiers
  2 that determines the class or value of a feature which contributes to one or more of the final
- 3 decision outputs of the frame classification and rate determination module may be a decision
- 4 tree classifier.
- 1 16. An apparatus as in claim 5, wherein one of the feature sub-classifiers
- 2 that determines the class or value of a feature which contributes to one or more of the final
- 3 decision outputs of the frame classification and rate determination module may be a rule-
- 4 based model classifier.
- 1 17. An apparatus as in claim 5, wherein the final decision module enforces
- 2 the rate, class and classification feature parameter limitations of the destination codec, so as
- 3 not to allow illegal rate transitions from frame to frame or so as not to allow a conflicting
- 4 combination of rate, class, and classification feature parameters within the current frame.
- 1 18. An apparatus as in claim 5, wherein the final decision module may
- 2 favor preferred rate and class combinations based on the source and destination codec
- 3 combination in order to improve the quality of the synthesized speech, or to reduce
- 4 computational complexity, or to otherwise gain a performance
- 1 19. The apparatus of claim 10 wherein the pre-installed coefficients in the
- 2 one of more feature sub-classifiers are data types from logical relationships, decision tree,
- 3 decision rules, weights of artificial neural networks, numerical coefficient data in analytical
- 4 formula and others depending on the structure and classification or prediction technique of
- 5 the sub-classifier.
- 1 20. The apparatus of claim 10 wherein the pre-installed coefficients in
- 2 feature sub-classifiers can be mixed data types of logical relationships, decision tree, decision
- 3 rules, weights of artificial neural networks, numerical coefficient data in analytical formula
- 4 and others when more than one classification or prediction structure is used for the feature
- 5 sub-classifiers.

2	feature sub-cl	assifier	s are derived from a classification construction module.			
1		22.	The apparatus of claim 21 wherein the classifier construction module			
2	comprises					
3		a train	ing set generation module;			
4		a classifier training module; and				
5		a class	sifier evaluation module.			
1		23.	A method for transcoding telecommunication signals, the method			
2	including prod	ducing	a frame class, rate and classification feature parameters for a destination			
3	codec using o	ne or m	ore parameters provided in a bitstream derived from a source codec, the			
4	method comp	rising::				
5		detern	nining one or more input parameters from a bitstream outputted from a			
6	source codec;					
7		inputti	ing the one or more input parameters to a classification process;			
8		proces	ssing the one or more input parameters in the classification process based			
9	upon information associated with the destination codec; and					
10		output	ting the frame class and a rate for use in the destination codec.			
1		24.	The method of claim 23 wherein the destination codec and the source			
2	codec are the same.					
1		25.	The method of claim 23 wherein the processing further comprises			
2	processing an	externa	al command in the classification process.			
1		26.	The method of claim 23 wherein processing further comprises			
2	processing pa	st classi	ification input parameters.			
1		27.	The method of claim 23 wherein processing further comprises			
2	processing past classification output parameters.					
1		28.	The method of claim 23 wherein processing further comprises			
2	processing pa	st inter	mediate parameters within the classification process.			

The apparatus of claim 10 wherein the pre-installed coefficients in the

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21.

1	29. The method of claim 23 wherein the processing comprises a direct
2	pass-through of one or more input parameters.
1	30. The method of claim 23 wherein the bit rate outputted from the source
2	codec is associated with a number of bits to represent a single frame.
1	31. The method of claim 30 wherein the number of bits is at least 171 bits.
1	32. The method of claim 30 wherein the number of bits is at least 80 bits.
1	33. The method of claim 23 wherein the determining one or more input
2	parameters from the source codec bitstream comprising:
3	determining a source code into component codes, the component codes being
4	associated with the one or more input parameters;
5	processing the component codes using an unquantizing process to determine
6	one or more of the input parameters; and
7	selecting one or more of the input parameters to produce the frame class and
8	the classification feature parameters for input into the destination codec.
1	34. The method of claim 23 wherein the classification process comprises:
2	receiving one or more of the input parameters from the source codec;
3	classifying N parameters using M sub-classifiers of the classification process;
4	processing outputs of the M sub-classifiers to produce the rate and the frame
5	class; and
6	providing the frame class and the rate to the destination codec.
1	35. The method of claim 33 wherein the component code is unquantized in
2	accordance the one or more input parameters from the source codec to produce one or more
3	intermediate speech parameters, the one or more intermediate speech parameters being
4	selected from one or more features including a plurality of pitch gains, a plurality of pitch
5	lags, a plurality of fixed codebook gains, a plurality of line spectral frequencies, and a bit rate
1	36. The method of claim 34 wherein each of the M sub-classifier is derived

from a pattern classification process.

1	37. The method of claim 34 wherein each of the M sub classifiers is			
2	derived using a large training set of input speech parameters and desired output classes and			
3	rates.			
1	38. The method of claim 34 wherein the classifier process is derived using			
2	a training process, the training process comprising:			
3	processing the input speech with the source codec to derive one or more			
4	source intermediate parameters from the source codec;			
5	processing the input speech with the destination codec to derive one or more			
6	destination intermediate parameters from the destination codec;			
7	processing the source coded speech that has been processed through source			
8	codec with the destination codec;			
9	deriving a bit rate and a frame classification selection from the destination			
10	codec;			
11	correlating the source intermediate parameters from the source codec and the			
12	destination intermediate parameters from the destination codec; and			
13	processing the correlated source intermediate parameters and the destination			
14	intermediate parameters using a training process to build the classifier process.			
15	39. The method of claim 37 wherein the training set is derived from a			
16	process comprising:			
17	process comprising.  processing one or more of the input parameters from the source codec;			
18	processing the one or more input parameters with the destination codec;			
19	processing the bit stream coded from the source codec with the destination			
20	codec;			
21	deriving one or more intermediate parameters from the source codec and the			
22	destination codec;			
23	retaining the bit rate and the frame class, the classification features parameters			
24	and the rate from the destination codec;			
25	correlating one or more parameters associated with the source codec to one or			
26	more parameters associated with the destination codec; and			
27	processing information associated with the parameters for a classifier training			
28	process.			

1	40. The method of claim 34 wherein each of the N subclassifiers is derived		
2	using an iterative training process, the training process comprising:		
3	inputting to the classifier a training set of selected input speech parameters;		
4	inputting to the classifier a training set of desired output parameters;		
5	processing the selected input speech parameters to determine a predicated		
6	frame class and a rate;		
7	setting one or more classification model boundaries;		
8	selecting a misclassification cost function;		
9	processing an error based upon the misclassification cost function between a		
10	predicted frame class and rate and a desired frame class and rate; and		
11	returning to setting one or more classifier model boundaries based upon the		
12	error and desired output parameters.		